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SHOULD ELECTRONIC COMMERCE RECEIVE PREFERENTIAL TAX TREATMENT?

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Abstract

This paper examines theoretical arguments supporting preferential sales tax treatment of electronic commerce, using a version of the standard optimal commodity tax model that includes distributional concerns, tax-exempt goods, a subset of individuals with highly elastic demand for Internet goods (which are close but imperfect substitutes for similar goods sold by traditional retailers), and relatively high administrative costs of taxing electronic commerce. The analysis concludes that tax exemption of electronic commerce is unlikely to be even close to optimal, with the optimal tax differentials calculated suggesting that the traditional prescription of uniform taxation of traditional and electronic commerce should not be over-ridden by optimal taxation concerns.

I. Introduction

A great deal of attention has been focused in recent years on state sales taxation of electronic commerce, with numerous papers (including the December 2001 special issue of the *National Tax Journal*) and at least three high level groups (the National Tax Association Communications and Electronic Commerce Tax Project, the U.S. Advisory Commission on Electronic Commerce, and the Streamlined Sales Tax Project) exploring various aspects of the issue. Views on the appropriate sales tax treatment of electronic commerce range across a broad spectrum. For example, the "majority proposal" of the Advisory Commission on Electronic Commerce (2000) would, if adopted, virtually eliminate sales taxation of remote electronic commerce (sales over the Internet from vendors outside of the taxing jurisdiction) and reduce the taxation of local electronic commerce. In particular, one recommendation that could lead to significant revenue losses would allow out-of-state online retailers to own conventional "bricks and mortar" affiliates in a state without triggering a requirement to collect use tax (a tax on sales from remote vendors that complements the sales tax), even if the in-state affiliate accepts refunds and performs warranty work on products purchased from the online retailer.

In marked contrast, McLure (2000) argues that the sales tax issues raised by the advent of electronic commerce merely highlight the long-standing problems of the state sales and use tax system, and that now is a propitious time for fundamental reform. He proposes an "ideal retail

sales tax" system consistent with the basic principles of sales taxation long advocated by public finance economists[1] — uniform taxation of a comprehensive consumption tax base on a destination basis, that is, with the revenues accruing to the state in which consumption occurs. Under McLure's approach, all states would agree on a common base that would include all consumption items, including services consumed by individuals, with each state then free to set its own rate. All businesses would be issued a uniform exemption certificate, and their purchases of all business inputs (defined as only those deductible under the federal income tax) would be tax exempt. Under this approach, all electronic commerce between businesses would be tax exempt, while all electronic commerce between businesses and consumers — and indeed all remote sales to consumers, including those made via mail order, telemarketing and television shopping networks — would be fully taxed. Other proposals fall between these two ends of the spectrum, including the model legislation proposed by the Streamlined Sales Tax Project (2001), as well as proposed treatments suggested by Fox and Murray (1997) and Mikesell (2000).

A central issue in all of these discussions is whether preferential sales tax treatment is desirable for electronic commerce. Zodrow (2000) argues that most of the arguments made supporting such preferential treatment, including the often-cited network externality argument (examined in Zodrow, 2002[2]), do not survive close scrutiny – or are at least highly suspect – and are thus unlikely to justify over-riding the traditional presumption that uniform sales taxation of all consumption expenditures is desirable. However, two of these arguments are potentially valid.

The first is that the administrative and compliance costs associated with applying the sales tax to electronic commerce — at least from remote vendors — are especially large, so that exemption

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[1] See Fox and Luna (2003) for a recent example and Zodrow (1999) for a general discussion.

[2]   Zodrow (2002) argues that although in principle the existence of beneficial network externalities in the network of computers that form and provide access to the Internet may provide a rationale for preferential tax treatment of electronic commerce designed to encourage the expansion of the network to its efficient size, this argument is weak under the current circumstances, especially given the recent rapid growth of the Internet. Moreover, even if such a tax preference were deemed desirable, sales tax exemptions of remote (or even all) e-commerce are a very poorly targeted, expensive and thus undesirable means of accounting for network externalities. In particular, tax exemption (or subsidization) of Internet access fees would be a much more targeted response to the issues raised by the existence of significant network externalities; note that the argument for such treatment is relatively stronger for fees for access to broadband, as the network of broadband users is still relatively small. The fact that such treatment already characterizes most U.S. states — and because new taxes on Internet access are prohibited under the Internet Tax Freedom Act — further weakens the case for any additional preferential treatment of electronic commerce.

from the requirement to collect use tax is appropriate.[3] [4] Under the current sales tax system, this argument has proved to be a compelling one. In particular, the U.S. Supreme Court has issued multiple rulings, most recently in its 1992 decision in *Quill Corp. v. North Dakota*, stating that requiring vendors without nexus in the taxing jurisdiction to collect use tax on remote sales is sufficiently complicated that it represents an unconstitutional restriction of interstate commerce. This complexity arises primarily because sales taxes are imposed by some 8,000 different entities, including state and local governments and various special taxing jurisdictions, with large variations in tax rates, bases and administrative rules (including procedures for filing, exempting sales, registration, sourcing sales and audit). In addition, the existence of digital goods, as well as the anonymity that sometimes characterizes Internet transactions (customers and vendors whose locations are uncertain or transactions conducted using anonymous "electronic cash" accounts) complicates enforcement even if it is legally required.

Note, however, that the practical importance of these problems is not obvious. For example, most transactions involve credit card purchases from well-established vendors, and widespread use of traceable electronic transactions may in fact facilitate tax collection (Bird, 2003). In addition, firms can purchase — or state governments could provide (free or at nominal cost) — computer software that will calculate tax liability for remote sales, and firms with little in the way of remote sales would be exempt under the de minimis rules provided by most proposals to tax remote sales. Moreover, the U.S. states are currently involved in an ambitious effort — the Streamlined Sales Tax Project (SSTP) — designed to simplify and unify the state sales tax system while allowing states flexibility in setting rates, presumably in the hope that a sufficiently uniform system will prompt Congress or the Supreme Court to require the collection of use tax by remote vendors (McLure, 2002). Nevertheless, it is certainly possible that imposing sales taxation on electronic commerce is — and will continue to be for the foreseeable future —

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[3] Vendors deemed to have a physical presence (nexus) within a taxing jurisdiction are required to collect tax on remote sales. However, since many Internet vendors have nexus in very few states, much of electronic commerce currently escapes sales tax.

[4] Note that these differentially high administrative costs would typically arise for tax collection by all remote vendors and are presumably less important for Internet sellers who have nexus in a taxing jurisdiction. Thus, although the text will follow common usage and discuss differential treatment in terms of traditional and electronic commerce, it should be remembered that the key distinction is between local and remote vendors.

somewhat more costly than taxing sales from "bricks and mortar" establishments located within a taxing jurisdiction, and that this potentially provides a rationale for preferential tax treatment.

Second, preferential treatment of electronic commerce may be desirable due to optimal commodity tax considerations. It is possible to construct scenarios under which uniform taxation of all consumption commodities is optimal, even purely from an efficiency perspective.[5] The key factor is the interaction between the demands for the various taxable commodities and the demand for untaxed leisure. If consumer tastes are such that leisure and consumption commodities are separable (loosely speaking, demands for consumption goods are independent of the demand for leisure/supply of labor), then uniform taxation is desirable to avoid distortions in consumer choices across the various consumption commodities – the standard case for uniform treatment. This tendency toward uniformity is reinforced by several practical considerations. Differential tax rates are difficult to administer, as they inevitably raise extremely troublesome classification issues and create incentives for tax avoidance and evasion. Moreover, "real world" commodity tax differentials are more likely to reflect political factors than optimal tax considerations, and thus reduce rather than enhance economic efficiency. As emphasized by Slemrod (1990), adherence to the principle of uniform taxation thus provides a critical "anchor" against the entreaties of special interests for preferential (and typically highly inefficient) tax treatment.[6]

Nevertheless, as is well known from this literature, a uniform commodity tax structure is generally not optimal, so that preferential treatment of electronic commerce is certainly a theoretical possibility (Auerbach and Hines, 2002). However, a consensus has not yet emerged on whether the standard optimal taxation arguments for differential taxation imply that preferential treatment of electronic commerce is desirable. For example, in a comprehensive review of the optimal taxation literature and its application to the taxation of electronic commerce, Bruce, Fox and Murray (2003) stress that differential commodity taxes arise

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[5] In general, the addition of an income tax, not considered in this analysis, would also make it less likely that differential commodity taxation would be desirable; in particular, under the appropriate conditions, equity goals can be satisfied solely with an appropriately progressive income tax (Saez, 2002, 2004; Kaplow, 2004).

[6] For further discussions of the practical difficulties of implementing commodity tax differentials and the administrative case for uniform taxation, see Harberger (1990) and Slemrod (1990).

primarily due to differences in relative substitutability with untaxed leisure (Corlett and Hague, 1953), and that this substitutability will assuredly be quite similar for commodities that differ only in whether they are purchased online or in a traditional retail outlet. (Note that this efficiency argument for differential taxation arises not only for leisure but for any goods that are untaxed, including those that are exempt for distributional or social reasons.)

Bruce, Fox and Murray also note that purchases over the Internet may be more elastic than similar purchases at a traditional retail outlet, so that preferential treatment may in theory be desirable, since another familiar optimal tax rule – which implies that optimal commodity tax rates should be set to cause equiproportionate reductions in compensated demands to minimize efficiency costs – tends to prescribe relatively low tax rates for goods with high own-price demand elasticities. For example, Goolsbee and Zittrain (1999, p. 418) suggest that "if the price elasticities of Internet customers and retail customers are very different it may actually be efficient to allow those with high elasticities to have lower rates … the least distortive tax would be the one with high rates on those people who would not change their behavior." Their argument draws on earlier work by Sandmo (1981), who considers optimal linear income taxation in a model with two groups of individuals, one of which may engage in work in an informal labor market where the tax on labor income can be collected only at a differentially high administrative cost. Sandmo shows that, apart from equity concerns, a relatively low (expected) tax rate on labor income in the tax-evading informal sector may be desirable on efficiency grounds if the own-price supply elasticity of labor to that sector is sufficiently large.[7] By analogy, Goolsbee and Zittrain (1999) argue that relatively low tax rates on electronic commerce may be desirable, again apart from equity concerns, since empirical evidence suggests that those individuals who avoid tax by purchasing goods over the Internet tend to be highly price responsive (Goolsbee, 2000). The argument is that high taxes on electronic commerce will tend to significantly distort the behavior of individuals who are Internet shoppers and thus will

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[7] Specifically, the own-price elasticity of supply of labor to the informal sector must exceed the absolute value of the cross-price elasticity of labor supply to the regular market with respect to the net wage in the informal market. Note that Sandmo's result is thus a relatively weak one – preferential tax treatment of wage income earned in the informal sector is desirable only if a tax increase in the informal sector causes a reduction in labor supply to that sector that exceeds in magnitude the associated increase in labor supply to the formal sector. In other words, if taxation of the informal sector merely reallocates labor from the informal to the formal market, then uniform taxation is desirable, regardless of the magnitude of the own-price elasticity of labor supply to the informal sector; preferential taxation of the informal sector is desirable only if it results in a net increase in labor supply.

have a high efficiency cost, relative to taxation of sales from traditional retailers, where the elasticity of demand is presumably lower.

The results discussed thus far focus on efficiency issues. However, equity concerns, based on the notion that the social marginal utility of income declines with income, have also been incorporated into the optimal commodity taxation literature (Diamond, 1975). The central message of this literature is that, in addition to the efficiency considerations discussed above, commodity tax rates should be differentially high on goods consumed disproportionately by those with relatively high incomes.[8] Goolsbee and Zittrain (1999) demonstrate that individuals who shop on the Internet tend to be high income and relatively well educated, as Internet shoppers on average have approximately $22,000 more in annual income and nearly two more years of education than traditional shoppers. However, they also note that this differential is declining over time. Thus, as argued by Bruce, Fox and Murray (2003), equity concerns are likely to imply that differentially high tax rates on electronic commerce will be appropriate, with this distinction declining over time.

It must be stressed, however, that all of these arguments are fairly conjectural since, as observed by Bruce, Fox and Murray (2003, p. 27), "Despite the large number of articles in the optimal tax literature that have addressed the issue of neutral commodity taxation, none have addressed the idea of non-neutral taxation of two units of the same good which are obtained for final consumption via different modes of purchase." The purpose of my research is to attempt to fill this void in the literature and shed some additional light on the question of whether the theory of optimal commodity taxation, taking into account equity concerns, the relatively high own-price elasticities of individuals who are Internet shoppers, and differentially high costs of administering taxation of electronic commerce, implies that preferential treatment of electronic commerce is desirable.

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[8]   Note that this line of reasoning is diametrically opposed to the "digital divide" argument which contends that preferential tax treatment of electronic commerce is desirable because it should facilitate use of the Internet by lower-income individuals. McLure and Hellerstein (2004) argue convincingly that this argument is not compelling, as preferential tax treatment for electronic commerce is an extremely poorly targeted and thus very expensive means of promoting use of the Internet by low-income individuals or achieving any distributional goals. Accordingly, the digital divide argument is not considered in the model utilized in this paper.

Should Electronic Commerce Be Subject to Preferential Tax Treatment?

The analysis adapts the standard optimal commodity taxation model (as described in detail in Auerbach and Hines (2002) in their review of the optimal taxation literature), to consider multiple goods that are close substitutes in their physical attributes, but are less than perfect substitutes because they differ in terms of their mode of purchase and other attributes such as ease of shopping, purchase and return, ability to "touch and feel" the good, and delivery costs, times and uncertainties, etc. In addition, the standard model is modified (1) to include distributional concerns, following Diamond (1975), (2) to include goods that are exempt from tax for social, political or administrative reasons, (3) to consider an economy in which only a subgroup of individuals purchases goods over the Internet, with the demand for such goods exhibiting a relatively high own-price elasticity, following the argument of Goolsbee and Zittrain (1999) and the model of Sandmo (1981) where only a subgroup of the population works in the informal labor market, and (4) to include differentially high costs of administering and complying with sales taxation of goods purchased over the Internet, following Kaplow (1990) who includes administrative costs in the optimal commodity tax problem, extending the analysis of Sandmo (1981) to the case of sales taxation.

It should be noted that the standard optimal taxation analysis adopted in this paper assumes that the commodity tax rates applied to both traditional and electronic commerce are perfectly flexible. In practice, the critical issue is much more likely to be whether electronic commerce (involving remote vendors) should be entirely tax exempt or should be taxed at the same rate as traditional commerce, rather than whether electronic commerce should receive a preferential rate.[9] Nevertheless, optimal taxation analysis can be quite informative to the policy debate. In particular, if the optimal tax rates for electronic commerce tend to cluster either around the standard rate applied to traditional commerce or around zero, then the analysis would provide strong support for full taxation or tax exemption, respectively.

The paper is organized as follows. The following two sections outline the theoretical optimal commodity taxation model used in Zodrow (2006) and describes how it was applied to analyze the question of the desirability of preferential sales tax treatment of electronic commerce. The

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[9]   In particular, legal issues involving the Commerce Clause as well as provisions requiring uniform taxation in many state constitutions are likely to preclude preferential rates in many cases.

fourth section provides some illustrative calculations of the key result of the optimal commodity taxation model analysis, attempting to shed some light on the relative magnitudes of the various effects, as well as the central issue of whether, on balance, preferential taxation or tax exemption of electronic commerce seems likely to be desirable. A concluding section summarizes the results.

II. The Model

An Outline of the Model

The model used in this research to analyze the optimal taxation of traditional and electronic commerce, which is detailed in Zodrow (2006), is a modified version of the standard single-period optimal commodity taxation model with fixed producer prices described in Auerbach and Hines (2002).[10] Individuals are assumed to maximize a standard utility function defined over several consumption goods and leisure. There is no source of exogenous income and only commodity taxes are allowed. There are two types of individuals in the economy *(A, B)* and the number of each type of individual is fixed. Individuals of type *A* never purchase goods over the Internet, while individuals of type *B* are frequent users of the Internet and often make purchases online. These rather stark assumptions both simplify the model and allow for clear analogies to the similar model of Sandmo (1981). However, they admittedly are fairly stringent, especially since one would expect that the number of individuals making online purchases (as well as the set of goods sold over the Internet as defined below) would increase over time.

In addition to leisure, which is the numeraire with a fixed price, there are four types of consumer goods in the economy. Goods x_E are exempt from commodity taxation, either for distributional reasons (they are consumed disproportionately by the poor), social reasons (e.g., health care, education), administrative reasons (e.g., some services), political reasons (e.g., services from owner-occupied housing), or some combination of the above. Goods x_N are never sold on the Internet, either for technical or historical reasons, and are not closely substitutable for goods sold

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[10] The model of consumer behavior utilized is also generally similar to that used by Alm and Melnick (2003) in their empirical analysis of the sensitivity of the demand for Internet goods to preferential tax treatment, except that it treats traditional goods and Internet goods as close rather than perfect substitutes and allows for leisure and a separate good that is exempt from sales tax for distributional or social reasons.

over the Internet. The remaining two categories of goods were the focus of the discussion above — goods that are sold both by traditional or "bricks and mortar" retailers and over the Internet. The model, following the argument made by proponents of preferential treatment of electronic commerce, makes the admittedly controversial assumption that these goods can be treated as separate commodities. Specifically, goods x_I are assumed to be sold only on the Internet, while goods x_S are sold only by traditional retailers. These two goods are assumed to be close but not perfect substitutes, differing only in mode of purchase and other attributes such as the nature and ease of shopping, purchase and return, the ability to "touch and feel" the good, and delivery costs, times and uncertainties, etc. [11] Because of their similarities, these two goods (x_S and x_I) are assumed to have very similar cross-price elasticities with the other two types of goods and with leisure.

There are two commodity tax (i.e., retail sales tax) rates in the model — t is applied to the taxable goods sold by traditional retailers (x_N and x_S) and   is applied to the goods sold over the Internet (x_I). Goods x_E and leisure are untaxed. Under a uniform tax on (taxable) commodities, $=t$, while preferential tax treatment of electronic commerce implies that $<t$.   The government must raise a fixed amount of revenue, net of administrative costs, using only the two sales tax instruments t and   . The government is assumed to choose the tax rates t and   to maximize a social welfare function that is a weighted sum of individual utility levels, with weights γ^A and γ^B; in the benchmark case, $\gamma^B = \gamma^A = 1$, and distributional concerns are introduced by assuming that $\gamma^B < \gamma^A$, since, as noted above, individuals of type B have higher income levels.

Raising revenues from sales taxation also results in administrative and compliance costs. The nature of these costs, in particular the differences in the relationships between these costs and the

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11 As noted by Bruce, Fox and Murray (2003), this assumption can be cast in the framework of Lancaster (1966), who argues that it is the attributes of a good, rather than the good itself, that determine consumer welfare. Whether the differences between otherwise identical goods purchased over the Internet and from traditional retailers are sufficiently important to merit treatment as different goods is open to debate – and, if not, then any potential case for preferential taxation of electronic commerce on optimal tax grounds vanishes. Nevertheless, the "different goods" argument has some plausibility and will, at least for purposes of argument, be made in this paper. Indeed, the general strategy utilized in the paper is to attempt to avoid any potential bias against preferential tax treatment of electronic commerce by adopting assumptions that tend to favor such treatment.

tax revenues raised from traditional and electronic vendors, is unclear, although one would expect that tax compliance costs would exhibit declining marginal costs for both traditional and electronic vendors. The common perception, discussed above, is that such costs would be higher for e-commerce due to the need to comply with use taxes and regulations in many different jurisdictions and because a disproportionately large fraction of e-commerce sales are attributable to relatively small vendors, and this may very well be the case. On the other hand, with the appropriate sales and use tax compliance software, these differences may be small, especially for larger vendors – and irrelevant for the many smaller vendors which would be excluded by de minimis rules. Indeed, for firms, even relatively small ones, engaged purely in electronic commerce that already have accurate records on mailing and billing addresses on all their customers for all sales, the additional costs of collecting use taxes may be less than the costs of sales tax compliance for a traditional retailer.[12] In any case, the analysis will assume that the marginal costs of compliance (c_t for traditional vendors and c_τ for electronic commerce vendors), which are assumed to be either constant or declining, are either the same or greater for electronic commerce vendors than for traditional vendors ($c_\tau \geq c_t$).

III. Description of the Optimal Tax Result

Within this context, the results obtained in Zodrow (2006) demonstrate that the optimal commodity taxation of traditional and electronic commerce depends on three sets of factors. Consider first a benchmark case in which administrative costs are the same for sales taxation of traditional retailers and Internet sales and distributional concerns are ignored. In this case, which

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[12]   A separate issue is the one-time set-up costs that would be incurred by currently tax exempt remote electronic vendors, which are ignored in the analysis in this paper (which, as noted above, does not explicitly consider the issue of whether electronic commerce should be taxed at all but rather the question of whether it should receive a significantly preferential rate). These fixed set-up costs should presumably be amortized over many future years (and arguably compared to similarly amortized fixed costs already incurred by traditional retailers in complying with existing sales taxes), but in any case typically would not appear in the optimal tax conditions derived below, which are functions of marginal costs. In any case, the omission of these fixed costs is not particularly problematic, since they typically would range from one to three years of annual software costs, so that their amortized value would not be large relative to annual costs. Moreover, set-up costs are largest for relatively small firms without existing enterprise software, many of which would be exempt from the requirement to collect use tax due to de minimis rules. For larger firms, especially those with enterprise software from an established vendor (e.g., Oracle or SAP), set-up costs would be at the lower end of this range. (These rough approximations were generously provided by Mr. Charles Collins of Taxware.) Note also that these figures suggest that tax compliance costs for firms engaging in electronic commerce – like tax compliance costs in general – result in a modest barrier to entry for the industry.

is the two-person analog to the familiar Corlett-Hague result when both leisure and one of the consumption goods (x_E) are untaxed, preferential treatment of electronic commerce is desirable only if the Internet good is more substitutable for leisure or the untaxed good, relative to the two other taxed goods in the model. This result simultaneously captures the concept that differential taxation is desirable only if it provides an indirect means of taxing goods that are untaxed (which, as described in detail in Zodrow (2006), is in turn closely related to the concept that preferential taxation of e-commerce may be desirable if the own-price elasticity of demand for Internet goods is relatively large), but that this concern must be weighed against efficiency concerns about distorting consumer decisions regarding purchases from Internet firms rather than from traditional retailers. The key parameters in this case are the various ε_{ij}^h, the compensated cross-price elasticities for individual $h=A,B$ of good $i=E,N,S,I$ with respect to the price of good $j=E,N,S,I$ or with respect to the price of leisure $(j=W)$.

Consider next the role played by distributional concerns assuming, consistent with the empirical data described previously, that the Internet good is consumed primarily by relatively wealthy individuals. In this case, even if Internet goods are substitutes with leisure and/or the untaxed goods and would thus tend to be taxed preferentially, distributional concerns will temper this result and may imply that goods sold over the Internet should be taxed more heavily than goods sold by traditional retailers if the difference in the distributional weights applied to the two individuals is sufficiently large. In this case, the key parameters are the social weights γ^A and γ^B, with distributional concerns introduced by assuming that $\gamma^B < \gamma^A$, since individuals of type B have higher income levels.

Finally, suppose that distributional concerns are ignored but the administrative costs of taxing Internet goods are greater than those associated with taxing goods sold by traditional retailers $(c > c_t)$.[13] Adding differential administrative costs to the model has two potentially offsetting effects. On the one hand, preferential taxation of traditional commerce is desirable to discourage consumption of Internet goods that are characterized by differentially high administrative costs.

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[13] This discussion is similar to the analysis of optimal commodity taxation in the presence of administrative costs by Kaplow (1990).

On the other hand, preferential treatment of electronic commerce is more likely to be optimal in the presence of relatively high administrative costs if Internet goods are more substitutable with leisure and the untaxed good.

IV. Some Illustrative Examples

The above discussion indicates that, as is inevitably the case for optimal tax problems, the final results are theoretically ambiguous and depend on the values of various key parameters. In particular, the case for or against preferential tax treatment of electronic commerce is especially ambiguous with respect to efficiency and administrative cost considerations, while distributional concerns suggest that preferential taxation is not desirable. This section attempts to shed some additional light on this issue by performing some sample calculations for the optimal tax rates t and τ under a balanced budget requirement which requires that the combined revenues from any configuration of taxation of traditional and electronic commerce equal the revenues, net of administrative costs, in the initial equilibrium. The measure of preferential treatment for Internet goods is defined as the tax differential favoring electronic commerce, as a percentage of the tax rate applied to traditional commerce, or $\phi = (t - \tau)/t$. Expressed in percentage terms, if $\phi =100$ the optimal tax structure implies tax exemption for electronic commerce, uniform treatment is reflected as $\phi =0$, and $\phi <0$ ($\phi >100)$ implies that electronic commerce should be taxed more heavily than traditional commerce (subsidized).

Parameter Values

As detailed in Zodrow (2006), the calculations below are based on parameter values taken from the empirical literature when available and plausible parameter values when empirical data are not available. These parameter choices can be summarized as follows. Bruce and Fox (2000) indicate that the average U.S. state sales tax rate (t) is 6.38 percent, and that about 21 percent of potentially taxable consumer sales over the Internet are taxed, either because the selling firm has nexus in the consumer's state of residence or because the state collects use tax, implying an effective tax rate on such sales τ of 1.33 percent. Using data from U.S. Department of Commerce (2002), the fraction of individuals who are Internet shoppers is set at 0.21. Drawing on income data presented by Goolsbee and Zittrain (1999), the ratio of consumption expenditures of group B to group A is set at 1.5. The consumption expenditures for the two

groups are allocated among the four goods in the model using data from the National Income and Product Accounts and drawing on Jorgenson (1997), which provides expenditure shares and income elasticities by income level for the classification of goods in the National Income and Product Accounts. The resulting expenditure shares and income elasticities for the two types of individuals and four goods are presented in Table 1, and the corresponding distribution of total consumption is presented in Table 2. Note that by assumption only individuals in Group B have expenditures on consumption of good X_I.

Table 1. Expenditure Shares and Income Elasticities

Consumption Good	Expenditure Share, Group A	Expenditure Share, Group B	Income Elasticity Group A	Income Elasticity Group B
X_E	0.495	0.421	0.673	0.554
X_N	0.334	0.326	0.995	0.912
X_S	0.171	0.189	1.955	1.857
X_I	0	0.064	0	1.857

Table 2. Consumption Expenditures by Group

Consumption Good	Total Expenditures ($ billion)	Share of Total Consumption	Expenditures of Group A ($ billion)	Expenditures of Group B ($ billion)
X_E	3,442	0.474	2,569	873
X_N	2,412	0.332	1,735	677
X_S	1,283	0.176	890	392
X_I	132	0.018	0	132
Total	7,269	1.000	5,194	2,074

Only limited data are available on the various own-price and cross-price elasticities. Drawing on data presented in Goolsbee (2000) which suggest a very high own-price elasticity of Internet

goods, the own-price demand elasticity is set at $\varepsilon_{II}^B = -4.0$.[14] Drawing on data presented in Fullerton and Rogers (1993), the benchmark values of the compensated cross-price elasticities of demand of the various goods with respect to the price of leisure are set at 0.25. All compensated cross-price elasticities involving the tax-exempt good and the other goods are assumed to be zero, as is the compensated cross-price elasticity of the goods that are assumed to be not substitutable with the goods sold over the Internet with respect to the price of the Internet good.

Drawing on data presented in Slemrod and Bakija (1996) on average administrative and compliance costs under the sales tax, the analysis assumes that marginal costs are constant with c_t=0.035, and that c is some multiple of c_t.

Finally, before proceeding to the simulation results, it should be noted that this analysis uses a partial equilibrium approach that ignores general equilibrium reactions between changes in the tax rates and various parameter values (such as income shares, income and price elasticities, marginal utilities of income, the marginal efficiency cost of taxation and, for purposes of the government budget constraint, the sizes of the sales tax bases), all of which are assumed to be unaffected by the simulated tax rate changes. It should thus be viewed as only suggestive of the optimal tax differentials that might arise in a more complete general equilibrium analysis, which could also be utilized to calculate the changes in excess burden associated with various tax structures. Given the considerable uncertainty surrounding the parameter values used, the calculations are performed for a range of parameter values.

Simulation Results

The first set of simulation results establishes a benchmark case, in which distributional concerns are ignored, administrative and compliance costs for taxing Internet goods are assumed to equal those for taxing traditional commerce, and the compensated cross-price elasticities for goods X_N, X_S (for both types of individuals) and X_I (for individuals of type B) with respect to leisure are set

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[14] Note, however, that Alm and Melnick (2003), using a more recent and comprehensive data set, present results that suggest a much lower own-price demand elasticity for Internet goods, on the order of one-fourth that estimated by Goolsbee (2000). However, since the implications of a high own-price demand elasticity for Internet goods are the focus of this paper – and in the spirit of making assumptions which tend to make the strongest case for preferential treatment of electronic commerce – the analysis will assume the higher value in the simulations presented below.

equal to 0.25. In this benchmark case, which is designed to maximize the optimality of equal taxation, the optimal tax rate on Internet goods is 6.08 percent, slightly less than the tax rate on traditional goods of 6.20 percent. This slight differential favoring electronic commerce arises only because individuals of type B are slightly more likely to spend additional income on taxed goods. As a result, slightly preferential tax treatment of Internet goods is desirable because it provides more income to individuals of type B, who in turn spend it disproportionately on taxed goods.[15] The resulting "optimal" tax differential of 0.12 percentage points (or a value of 1.8 percent) due to this factor is, however, negligible.

Consider next variations in the degree of substitutability of Internet goods for leisure (ε_{IW}^{B}).[16] Larger (smaller) values of this elasticity should lead to lower (higher) tax rates on Internet goods, as they are less (more) complementary with leisure, and this pattern is observed in Table 3. However, variations in the cross-price elasticity over a considerable range ($-0.50 < \varepsilon_{IW}^{B} < 1.0$) lead to only moderate variation in the tax rates, as the optimal tax differentials vary from -0.65 to 0.88 percentage points, with the e-commerce tax preference measure ( ) clustering in the neighborhood of zero ($-10.5\% < \phi < 14.1\%$), indicating that the optimal tax preference for Internet goods is at most about 14 percent for the range of parameter values analyzed, and should in fact be negative for the values of $\varepsilon_{IW}^{B} < 0.25$, reflecting a surtax as large as nearly 11 percent.

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[15] This result obtains because the social marginal utility of an additional dollar of income to each of the two types of individual reflects not only distributional concerns but also the revenue benefit to the government from their consumption of taxed goods; for a derivation of this result, see Auerbach and Hines (2002).

[16] All variations in the relative substitutability of the Internet good for leisure (or for the untaxed good) are assumed to be accompanied by identical variations for the closely substitutable good X_S.

Table 3. Variations in Substitutability of X_I for Leisure

ε_{IW}^B	-0.50	-0.25	0.00	0.25	0.50	0.75	1.00
t	6.17%	6.18%	6.19%	6.20%	6.21%	6.22%	6.23%
	6.83%	6.58%	6.34%	6.08%	5.85%	5.60%	5.35%
t-	-0.65%	-0.40%	-0.14%	0.12%	0.37%	0.62%	0.88%
	-10.5%	-6.4%	-2.3%	1.8%	5.9%	10.0%	14.1%

The cross-price elasticity of the Internet good with untaxed goods is also an important parameter in determining the extent of taxation of electronic commerce. Although the base case assumption that this elasticity is zero seems plausible, a higher (lower) value of ε_{IE}^B, for any given value of ε_{IW}^B, would tend to imply lower (higher) taxation of the Internet good, as it would be less (more) complementary with the untaxed good. This is demonstrated in Table 4, which gives the optimal tax differentials for the same range of ε_{IW}^B, that is, $-0.50 < \varepsilon_{IE}^B < 1.00$, when $\varepsilon_{IE}^B = 0.25$ rather that the benchmark value of $\varepsilon_{IE}^B = 0$. As expected, this increases the likelihood that preferential taxation of electronic commerce is desirable, although the effects are fairly modest. Specifically, the optimal tax differentials now vary from -0.40 to 1.13 percentage points, with the e-commerce tax preference measure . .shifting up about 4 percentage points, as it varies from $(-6.4\% < \phi < 18.2\%)$. Thus, in this case, the maximum optimal tax preference for Internet goods increases from around 14 percent to roughly 18 percent for the range of parameter values analyzed, and is negative only for the negative values of ε_{IW}^B, with a maximum surtax of 6.4 percent.

Table 4. Variations in Substitutability of X$_I$ for Leisure ($\varepsilon^B_{IE} = 0.25$)

ε^B_{IW}	-0.50	-0.25	0.00	0.25	0.50	0.75	1.00
t	6.18%	6.19%	6.20%	6.21%	6.22%	6.23%	6.24%
	6.58%	6.34%	6.09%	5.85%	5.60%	5.35%	5.10%
t-	-0.40%	-0.14%	0.11%	0.37%	0.62%	0.88%	1.13%
	-6.4%	-2.3%	1.8%	5.9%	10.0%	14.1%	18.2%

The effect of adding distributional concerns to the analysis is less ambiguous and somewhat more significant. Suppose that social concern about the (current) fact that Internet users are relatively high income individuals is expressed by utilizing weights in the social welfare function such that $\gamma^B < \gamma^A = 1$. Although the appropriate weights, if any, are inherently subjective, a value of γ^B outside the range of $0.5 \leq \gamma^B \leq 1$ seems implausible, especially since the consumption levels of the two groups are not radically different (recall that the consumption level of group B is 1.5 times the consumption of group A).[17] Table 5 provides results for this variation in γ^B for the benchmark case in which $\varepsilon^B_{IW} = 0.25$ (and $\varepsilon^B_{IE} = 0$). These results demonstrate that such weighting significantly affects the optimal tax differential, implying a surtax on the Internet good – since it is consumed disproportionately by the relatively high income group – that goes as high as 2.4 percentage points. Similarly, the e-commerce tax preference measure ϕ is negative for all values of $\gamma^B < 1$, implying surtaxes that range up to 38.5 percent.

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[17] The maximum differential in the distributional weights shown in Table 5 corresponds roughly to a social welfare function with an elasticity of the marginal social valuation of individual utility of one, as a fifty percent increase in an individual's consumption gives rise to a 50 percent reduction in the individual's social weight.

Table 5. Variations in Social Weight on Higher Income Individuals

($\gamma^A = 1.0$, $\varepsilon_{IW}^B = 0.25$, $\varepsilon_{IE}^B = 0$)

γ^B	1.00	0.95	0.90	0.80	0.70	0.60	0.50
t	6.20%	6.18%	6.16%	6.14%	6.13%	6.12%	6.11%
	6.09%	6.75%	7.19%	7.75%	8.08%	8.31%	8.47%
t-	0.11%	-0.57%	-1.03%	-1.61%	-1.96%	-2.19%	-2.36%
	1.8%	-9.3%	-16.8%	-26.2%	-31.9%	-35.8%	-38.5%

Differential administrative and compliance costs also play an important role in determining the optimal tax rate on Internet goods. For example, consider the benchmark case ($\varepsilon_{IW}^B = 0.25, \varepsilon_{IE}^B = 0$, $\gamma^A = \gamma^B = 1.0$), and suppose that the marginal administrative and compliance costs of taxing Internet goods are somewhere between equal to and twice the costs of taxing other goods, where the latter costs are assumed to be 3.5 percent of revenues ($c_t = 0.035$). Table 6 presents the results for this case.

Table 6. Variations in Administrative and Compliance Costs for X_I

($c_t = 0.035$, $\varepsilon_{IW}^B = 0.25, \varepsilon_{IE}^B = 0$, $\gamma^A = \gamma^B = 1.0$)

c_τ	0.035	0.040	0.045	0.050	0.055	0.060	0.070
t	6.20%	6.21%	6.21%	6.22%	6.22%	6.23%	6.24%
	6.09%	6.00%	5.90%	5.80%	5.70%	5.60%	5.39%
t-	0.11%	0.21%	0.31%	0.41%	0.52%	0.62%	0.84%
	1.8%	3.4%	5.0%	6.7%	8.3%	10.0%	13.5%

These results suggest that differentially high administrative and compliance costs for taxing Internet goods put moderate downward pressure on   . In particular, although there is a tendency for higher administrative and compliance costs to lead to higher tax rates on Internet goods in order to discourage consumption of goods with high tax administration costs, this effect is

outweighed by the interaction between the higher administrative and compliance costs and the cross-price elasticity effects described above. The net result is that the optimal sales tax differential favoring Internet goods increases monotonically, ranging from $0.11 - 0.84$ percentage points, with the Internet good preference parameter ranging from $1.8\% \leq \phi \leq 13.5\%$. Nevertheless, given the significant increase in costs at the high end of this spectrum (a doubling from 3.5 to 7.0 percent of total revenues), the fact that the optimal tax preference for Internet goods is a maximum of less than 14 percent suggests that higher administrative and compliance costs by themselves do not justify a significant preference for electronic commerce.

A wide variety of interactions among the various parameters can also be examined. Consider first the interactions between variations in administrative and compliance costs and differences in the cross-price elasticities of the Internet good with leisure and untaxed goods. These are explored in Table 7, which examines the effects of higher administrative and compliance costs for the case in which the Internet good is relatively substitutable with leisure and the untaxed good ($\varepsilon_{IW}^{B} = 0.75$, $\varepsilon_{IE}^{B} = 0.25$), and in Table 8 which illustrates the case in which the Internet good is relatively complementary for these goods ($\varepsilon_{IW}^{B} = -0.25$, $\varepsilon_{IE}^{B} = -0.25$). These results indicate that the differences in cross-price elasticities have the expected effect on the optimal tax rates on Internet goods. When Internet goods are relatively substitutable with leisure and the untaxed good, preferential taxation of Internet goods is always desirable, with differentials that range from $0.88 - 1.91$ percentage points (Table 7). Even in this case, however, the maximum value of the Internet good tax preference parameter for the range of parameters considered is still at most roughly 30 percent. In contrast, when Internet goods are relatively complementary with both leisure and the untaxed good, the effects of increases in administrative costs are never strong enough to offset the tendency to tax leisure complements at differentially higher rates, with surtaxes on Internet goods ranging from 10.5 to 3.7 percent (Table 8).

Table 7. Variations in Administrative and Compliance Costs for X_I

$$(c_t = 0.035,\ \varepsilon_{IW}^B = 0.75,\ \varepsilon_{IE}^B = 0.25,\ \gamma^A = \gamma^B = 1.0)$$

c_τ	0.035	0.040	0.045	0.050	0.055	0.060	0.070
t	6.23%	6.24%	6.24%	6.25%	6.25%	6.26%	6.27%
	5.35%	5.22%	5.08%	4.94%	4.80%	4.66%	4.36%
t-	0.88%	1.02%	1.16%	1.31%	1.46%	1.60%	1.91%
	14.1%	16.3%	18.6%	20.9%	23.3%	25.6%	30.4%

Table 8. Variations in Administrative and Compliance Costs for X_I

$$(c_t = 0.035,\ \varepsilon_{IW}^B = -0.25,\ \varepsilon_{IE}^B = -0.25,\ \gamma^A = \gamma^B = 1.0)$$

c_τ	0.035	0.040	0.045	0.050	0.055	0.060	0.070
t	6.17%	6.18%	6.18%	6.18%	6.19%	6.19%	6.20%
	6.83%	6.77%	6.72%	6.66%	6.61%	6.55%	6.43%
t-	-0.65%	-0.59%	-0.54%	-0.48%	-0.42%	-0.36%	-0.23%
	-10.5%	-9.6%	-8.7%	-7.7%	-6.8%	-5.8%	-3.7%

Finally, the interaction between distributional concerns and differential administrative costs is examined in Tables 9 and 10. Consider first the benchmark case ($\varepsilon_{IW}^B = 0.25,\ \varepsilon_{IE}^B = 0$) but suppose that administrative and compliance costs for taxing Internet goods are twice those for other goods ($c_t = 0.035,\ c_\tau = 0.070$), and the range of distributional weights is the same as in Table 5. The results for this case are given in Table 9, and suggest that distributional concerns rapidly outweigh the effects of differential administrative costs, as the optimal tax rate on Internet goods roughly equals the rate on other goods for $\gamma^B = 0.95$ ($\tilde{\iota}$ and the optimal tax preference parameter for the Internet good indicates a surtax of nearly 40 percent, when $\gamma^B = 0.5$.

Table 9. Variations in Social Weight on Higher Income Individuals

($\gamma^A = 1.0$, $c_t = 0.035$, $c_\tau = 0.070$, $\varepsilon_{IW}^B = 0.25$, $\varepsilon_{IE}^B = 0$)

γ^B	1.00	0.95	0.90	0.80	0.70	0.60	0.50
t	6.24%	6.20%	6.18%	6.16%	6.14%	6.13%	6.12%
	5.39%	6.28%	6.87%	7.60%	8.05%	8.34%	8.55%
t-	0.84%	-0.07%	-0.68%	-1.45%	-1.91%	-2.21%	-2.43%
	13.5%	-1.2%	-11.1%	-23.5%	-31.0%	-36.1%	-39.7%

This strong result is only tempered somewhat if Internet goods are relatively substitutable for leisure and untaxed goods. To take the case among those analyzed thus far that is the most favorable to a tax preference for electronic commerce, suppose that $\varepsilon_{IW}^B = 0.75$, $\varepsilon_{IE}^B = 0.25$ and administrative costs for taxing Internet goods are still double those of other goods ($c_t = 0.035$, $c_\tau = 0.070$). In this case, even though the tax preference parameter is roughly thirty percent in the absence of distributional concerns, such concerns are sufficiently important to result in a roughly uniform taxation for $\gamma^B = 0.9$ ($\phi = -0.04\%$), and the tax preference parameter indicates a surtax on Internet goods of nearly 38 percent when $\gamma^B = 0.5$.

Table 10. Variations in Social Weight on Higher Income Individuals

($\gamma^A = 1.0$, $c_t = 0.035$, $c_\tau = 0.070$, $\varepsilon_{IW}^B = 0.75$, $\varepsilon_{IE}^B = 0.25$)

γ^B	1.00	0.95	0.90	0.80	0.70	0.60	0.50
t	6.27%	6.23%	6.20%	6.17%	6.15%	6.14%	6.13%
	4.36%	5.49%	6.25%	7.20%	7.78%	8.17%	8.45%
t-	1.91%	0.74%	-0.04%	-1.03%	-1.63%	-2.03%	-2.32%
	30.4%	11.9%	-0.7%	-16.8%	-26.6%	-33.1%	-37.9%

V. Conclusion

The goal of this research was to identify the factors that determine whether preferential taxation of electronic commerce is desirable from an optimal taxation perspective and to provide some calculations that illustrate the implications of plausible values for these factors. The model constructed built on existing results from the literatures on optimal commodity taxation, including both efficiency and equity concerns, taxation and administrative costs, and the taxation of electronic commerce. The analysis stressed a balancing of the tendency toward uniform taxation due to efficiency concerns about distorting consumer decisions across consumption commodities as well as the essential physical similarity of goods sold over the Internet and by traditional retailers against the tendency for differential taxation attributable to differences between the goods, including differences in various demand elasticities, distributional preferences and administrative and compliance costs. The analysis identified the parameters that are critical in characterizing these offsetting tendencies, and provided some illustrative calculations as a means of determining their net effects and thus ascertaining whether it appears that uniform or preferential taxation of electronic commerce is desirable.

The results indicate that, as is generally the case in optimal taxation problems, the optimal tax treatment of traditional and electronic commerce varies considerably depending on key parameter values (highlighting the need for more empirical data on these parameters), implying preferential tax treatment of electronic commerce in some cases and higher taxes in others.

Nevertheless, even though the assumptions of the model were generally chosen to maximize the likelihood that preferential treatment of electronic commerce would be desirable, the results suggest that, in the practical terms of the current debate, uniform tax treatment of traditional and electronic commerce is much more likely to be desirable than tax exemption (or, alternatively, a significant tax preference for e-commerce). In none of the cases analyzed did the optimal tax rate approach zero, with the largest "optimal" tax preference for electronic commerce on the order of 30 percent, and many much less than that. A key factor leading to prescriptions for moderate preferential treatment of sales over the Internet was relatively high administrative and compliance costs, lending some credence to the argument that uniform taxation is much more likely to be desirable if advances in computer software or simplification efforts such as those proposed and to some extent implemented under the Streamlined Sales Tax Project (or even more radical proposals for simplification such as that advanced by McLure (2000)) are successful in reducing the costs of administering and complying with taxation of sales over the Internet. On the other hand, differentially higher taxation of Internet goods was also optimal in a variety of cases, with the always controversial addition of distributional concerns playing a large role in prescribing relatively high tax rates on Internet goods, and in some cases resulting in surtaxes in the neighborhood of 35-40 percent. Indeed, the simplest characterization of the results presented in this paper is that the optimal tax rates on electronic commerce tend to cluster around the rate applied to traditional commerce. Thus, on balance, it seems clear that tax exemption of Internet goods is very unlikely to be even close to optimal, and the optimal differentials calculated in this paper suggest that it is unlikely that the traditional prescription of uniform taxation should be over-ridden by optimal taxation concerns, especially once the administrative and political difficulties of implementing differential taxation are taken into account.

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